International Harmonised Research Activities
Vehicle Compatibility Working Group

Minutes of the Fourth Meeting, held at Fiat, on 13 - 14 October 1998

Present:	P O'Reilly	Chairman	G Neat	USA
	A Hobbs	Secretary	K Oki	Japan/Industry
	E Faerber	EU/EEVC	R Zobel	Industry
	D Cesari	EU/EEVC	Ms D Collard	Canada (14th only)
	T Hollowell	USA	M Di Leo	Observer/Host

The chairman welcomed the delegates, especially new delegates from Canada and industry. Apologies for absence were received from Dr Prasad, Mr Seyer and Prof Wicher. The minutes of the previous meeting were agreed and the secretary advised the group that updated document and address lists will be circulated with the minutes.

The chairman reported that he had received a copy of a report of a study carried out by the FIA/AIT and ADAC. This discussed compatibility and he had asked for copies of the report to be sent to each delegate.

Technical Presentations

The technical presentations from the EU/EEVC and USA were made, on 13 October 1998, to a joint meeting with EEVC WG15.

EU/EEVC

Mr Huibers explained the Madymo modelling work he was carrying out at TNO. The Madymo models are developed from FE models provided by NHTSA. The Chrysler Neon model is the most complete but the model needs to be adjusted for use in particular impact configurations. However, he considered it suitable for modelling car to car and car to offset deformable barrier (ODB) impacts. He raised some concerns about the ability of the models to cope with complex crash modes. He was concerned about modelling the footwell and the cross facia tube and its support of the steering column. The side impact work has yet to start, using the same model. Work has just started on validation of the Ford Taurus model but the models of the Geo Metro and Ford Explorer have yet to be started.

Dr Zobel explained that in the Brite-Euram project, FE modelling was being used as a supplement to crash testing. Insufficient funds are available to carry out parametric studies. The initial part of the Brite-Euram work is concentrating on accident studies which are currently proving to be inconclusive.

He explained that IHRA members would be welcome to attend an accident workshop, which he had proposed for early February 1999. **Action Dr Zobel**

Mr Huibers reported that Dagmar Buzeman had proposed that Chalmers University might develop a PC based model. He will contact Prof Lovsund and report progress at the next meeting.

Mr Huibers presented some load cell wall data from Euro NCAP tests. In these, he noted that the greatest load was seen at the lower edge load cell. From summing the data, a global force deflection characteristic could be obtained. From this he could identify the initial barrier stiffness and then the progressively increasing stiffness of the car front.

Mr Hobbs presented earlier crash test results where over-riding was seen in impacts between some identical car models. He showed that the more uniform deformation pattern of some other cars prevented this over-riding. The Ford Mondeo had been seen to be good in this regard. However, in an impact between two Mondeos, with 100 mm difference in ride heights, very significant over-riding was observed. As a consequence, the pattern of damage and intrusion on the two cars was very different. This led Mr Hobbs to conclude that ensuring good geometric interaction might be difficult. However, he did consider it to be a pre-requisite to improving other aspects of compatibility.

TRL also had similar load cell wall data to that presented from TNO. He went on to present data from full width rigid wall impacts showing that it should be possible to use such a test to map the force deflection characteristics of the separate parts of the car's front. This might form one basis for measuring compatibility. He suggested that with a larger number of small load cells it would be possible to obtain horizontal and vertical force time histories. Further to this it might be possible to control the variation in these time histories for lateral strips and to require a graduated vertical distribution. In this way, it might be possible to encourage more homogeneous car fronts whilst at the same time encouraging the stiffest structures to be lower in the car's front.

A number of members considered the use of a load cell wall beneficial and thought that the use of small load cells would give better discrimination. Dr Zobel explained that MIRA had a load cell wall with very small load cells. He was concerned that a sensible balance was maintained between having sufficient data and cost.

Mr Hobbs suggested that a possible test for compatibility might be a full width US NCAP type test with such a load cell array. A possible improvement might be to incorporate a thin deformable face. Such a face could fulfil two functions. It could attenuate the very high accelerations seen by the very front structures of the car. Secondly, there could be a requirement not to puncture a thin aluminium skin on the front of the deformable element.

USA

Dr Hollowell summarised the side impact test results with Sports Utility Vehicles. He also presented a series of car to car angled frontal impact tests (Doc 15). These tests were carried out at 35 mph and at an angle of 30 degrees with a 50^{th} percentile male driver and small female passenger. He explained that these tests were proving to be a severe test of airbags, as many of the dummies were seen to move sideways in the impact. Mr Hobbs was concerned about the lack of loading on the front structure of the car impacted. He thought that the degree of overlap, combined with the 30E angled approach had resulted in the front structure being missed and might be un-representative. He also thought that it might be difficult to design a car for such an impact.

Dr Hollowell also distributed copies of his ESV paper on (Doc 16) along with copies of a presentation based on that given to the SAE Top Tec meeting (Doc 17) and a presentation detailing the US Modelling Activities (Doc 18).

Japan

Mr Oki presented data on the Japanese fleet and overall accident statistics. He concluded that the largest accident problem in Japan was related to crashes involving passenger cars and mini passenger cars. The 50th percentile speed for fatal and serious casualties was said to be 45 km/h and the average kerb weight was found to be 865 kg. He went on to present an analysis which predicted the hypothetical savings in casualties in small cars, if they offered the same protection as the average car. He completed his presentation by comparing some car to car and car to ODB tests (Doc 19).

Canada

Ms Collard reported that LTVs were a growing part of the Canadian fleet. Currently, they make up 32 percent of the light duty fleet but sales are running at 47 percent. This compares with 31 percent in 1991. In future the VIN number will be recorded, so more detailed analyses should be possible.

Future Research Programmes

EU/EEVC

BAST and TRL have been in a position to carry out work, outside the EU funded programme. Dr Cesari explained that INRETS was now also in a position to do such work. The opportunity has been taken to use this extra capability to carry out exploratory work prior to the commencement of the EU test programme. However, it is now time for the EU programme to be agreed and started.

BASt has tried to compute interface force in an ODB test. However, Mr Faerber reported that they were not as successful as TRL and so they will repeat the test. They also have plans to test a car with the engine compartment filled with aluminium honeycomb. A further test will involve replacing the engine with a light weight substitute. BASt also plan to carry out an angled approach car to car test. In this test the approach angle will be less than 30E. All of these tests should be completed by the end of December 1998.

TRL has two programmes of tests, for the near future. One will continue to research a better understanding of compatibility. The other will try to develop a method of measuring those aspects which are currently understood to influence compatibility. In the first programme a small car, Ford Fiesta, is being crashed in a number of different configurations. These are: heavy v light, raised v lowered, car to MDB and car to car. In the car to car and MDB tests, comparisons will be made between one and two moving vehicles. With regard to side impact, it is intended to test with a higher and lower ground clearance of the MDB, on a car which performs well without use of a side airbag.

For the second part of the programme, full width impacts will be carried out against a load cell wall, with and without a thin deformable face. This programme will study the possibility of controlling the force distribution across the car front.

The EU supported programme includes a total of 14 car to car or barrier crash tests. These will be carried out at five centres: BAST, Fiat, INRETS, INSIA and TRL. Mr Hobbs suggested that the test programme might compare performance against load cell walls with that in car to car tests. Dr Cesari supported this and suggested that cars might be chosen on the basis of their deformation in Euro NCAP tests. Mr Di Leo explained that Fiat intended to carry out a car to car impact between a Fiat Brava and a Lancia Kappa. These were different mass cars with similar frontal structures. Messrs Faerber, Cesari and Hobbs felt that the EU test programme should be co-ordinated and agreed jointly. Mr Hobbs, the programme leader, will be arranging a meeting in the near future.

Mr Hollowell commented that he would like to see the EEVC modelling work, extended to a smaller car. Dr Zobel agreed to supply data from their modelling work, carried out in the 1980s. Mr Hobbs will also write to Dr Zobel to ask if any FE models could be made available for the study. The EEVC WG15 were asked to circulate a list of models chosen for crash testing, when they are available. **Action Dr Zobel and Mr Hobbs**

Japan

Mr Oki said that Japan will consider including a small Japanese car in their test programme. It may also be possible to test using the proposed EU/EEVC test against a full width load cell wall. If they do agree to carry out such tests, Mr Oki will check the test conditions with Mr Hobbs.

Canada

Ms Collard presented a paper which detailed the Canadian research programme (Doc 20). No tests are currently planned to address compatibility directly but there is a planned programme of side impact tests which should provide useful information. In years 1997-99, between 2 and 4 side impact tests will be conducted. This is expected to increase to between 8 and 12 tests in 1999-2000.

IHRA Future Programme Plan

The programme timetable was discussed and Document 13 will be updated to 13b. Copies will be distributed with the minutes. In the timetable, structural survey has been separated out from fleet studies and, where relevant, Brite-Euram activities are also given. No information has been included for Australia. As an action from the minutes, Mr Seyer is requested to supply information for the timetable to the secretary. **Action Mr Seyer**

Fleet Studies Dr Zobel will ask ACEA for registration based fleet data for Europe. Dr Cesari will also ask the Ministry representatives at the EEVC Steering Committee meeting for information about the fleet. **Action Dr Zobel and Dr Cesari**

Structural Surveys Ms Collard will enquire at Transport Canada about whether a structural survey could be conducted. **Action Ms Collard**

Accident Studies Mr Oki will ask ITARDA if they could supply accident analyses to inform the compatibility work. Ms Collard will see if it is possible to relate accident statistics to structural data and possibly carry out an in-depth study. **Action Mr Oki and Ms Collard**

IHRA Web Site

Dr Hollowell explained that the Steering Committee had asked for information to go on an IHRA area of the NHTSA web site. It will be possible to have documents held in a password protected secure area where members could access and download copies. It was agreed that, in future, all papers and presentations should be provided in electronic form as well as any hard copies which are made available at meetings. Contributors should ensure that they are supplied in Microsoft Office format, preferably Office 97. Each contribution should be on a **single** floppy disk, Zip disk or CD ROM. The secretary will then supply the material to NHTSA.

Attendance at IHRA Meetings

Mr Hobbs suggested that it might be desirable for Chairmen of IHRA Working Groups, or their deputy, to have the option to attend other IHRA meetings. This was particularly relevant to the Compatibility, Frontal and Side Impact groups. Dr Hollowell agreed to suggest this to the IHRA Steering Committee.

Next Meeting

The chairman will discuss with Mr Lomonaco, the possibility of holding the next meeting at the same time as that of the Frontal Impact IHRA group. It is likely to be between the middle of February and early March. It was suggested that the following meeting could be held, in the US, at the time of the Stapp conference in 1999. This could be at the conference location or at George Washington University.

C A Hobbs
Secretary
4 November 1998